WILDLIFE MANAGEMENT AND RESEARCH NOTES

No.		DATE
984	**AUTHOR:** W. Adam Phelps, Waterfowl Research Biologist	9/10/2009
	TITLE: Waterfowl Population Surveys	

Abstract: *The peak number of ducks observed in Indiana's Weekly Waterfowl Inventory during fall and winter had consistently decreased since 1999, but seems to have leveled off in the last few years. Harvest has a stable to increasing trend. One hundred three plots were surveyed for geese and duck during April and early May 2009. The estimated statewide population of breeding giant Canada geese (*Branta canadensis*) was 84,215 during the 2009 breeding season. The estimated number of breeding pairs was 41,104. These estimates include geese in urban areas. No estimate of mallard breeding population was possible this year, due to reduced flight time.*

History

The objective of this study was to provide annual spring population estimates, within ± 25%, of breeding Canada geese and ducks in Indiana, and to provide an annual index of fall and winter migratory waterfowl populations in Indiana. We use three different surveys for these purposes. The Weekly Waterfowl Inventory (WWI) is conducted in the fall and winter to track migration. The Spring Canada Goose Survey is an aerial survey to count breeding Canada geese in the state. Finally, the Spring Duck Survey is an aerial survey, conducted at the same time as the Canada Goose survey, to count breeding ducks.

Methods

2008-2009 Weekly Waterfowl Inventory. Waterfowl and other wetland-associated migratory birds are counted weekly from late August through late January on participating state fish and wildlife areas, reservoirs, national wildlife refuges and select private lands. Modes of transportation vary by property (i.e., automobile, boat, or walking), but all participants count all waterfowl seen on established routes. Participants conduct counts early in the week to avoid duplicate counting of the same birds at different areas.

2009 Spring Canada Goose Survey. This survey is normally conducted during the peak incubation period (early- to mid-April). This year the surveys were flown on 7, 9, and 15 April and 4 May 2009. Flights were scheduled for 2, 7, 9, 14, 16, and 21 April, but most were delayed by weather or bumped by other users until it was too late to fly the surveys.

The state is divided into low (0-1 breeding pairs), medium (2-4 breeding pairs), and high goose density (more than 5 breeding pairs) 1 mi^2 plots. These divisions are based on a combination of a 1992 estimate of goose density across the state and updates provided from annual survey results. Survey plots are 2 mi^2 (1 mi x 2 mi) and are maintained using a DeLorme mapping system. During flight, the mapping system is integrated with a GPS to aid navigation. Surveys are flown from a helicopter during favorable weather conditions (winds < 15 mph, survey not conducted or is discontinued if moderate to heavy rain, fog, or snow occurs) (USFWS and CWS 1987).

For the fourth year, an urban survey was performed for breeding Canada geese. Urban areas were selected in ArcGIS. The following areas were selected for this year's surveys: northwest Indiana (St. John to Gary); South Bend and Mishawaka; Ft. Wayne; Muncie; Anderson; Indianapolis; Kokomo; Terre Haute; Lafayette; Bloomington; Clarksville; and Evansville. Stratified random points were then selected from the high/medium/low density network of points described above. Three high density, 19 medium-density, and 39 low-density routes were selected. Points of the same density were connected using roadways within the urban zones. Routes were surveyed by two individuals (the waterfowl biologist and the urban wildlife biologist). All geese within 50m of the roadway were counted. This is different from previous years, when 100m was the distance used. The area surveyed and densities of geese were calculated to estimate urban populations.

All Canada geese seen are categorized as one of the following: single with a nest; single with no nest; pairs with a nest; pairs with no nest; or group. The number of indicated breeding pairs in each plot is determined by summing the number of pairs with a nest and either the number of singles or the number of singles with a nest (whichever is greatest).

2009 Spring Duck Survey. As a result of limited funding, this survey is typically conducted in conjunction with spring Canada goose surveys. These surveys normally occur in early- to mid-April, at a time when many ducks are beginning incubation. Unfortunately, this is also a time when there are usually migrant ducks still in the state. Duck counts are conducted within the same plots as the spring Canada goose survey.

Results

2008-2009 Fall and Winter Survey. The summer was relatively mild and wet. Heavy rains began in January, and continued through the spring and all summer. These rains affected brood rearing habitat in nearly every part of the state. Many properties were not able to plant crops at all, due to standing water during most of the growing season. High water also contributed to low apparent Canada goose recruitment in much of the state. Conditions then became quite cold much earlier than usual. Much of the South Zone had skim ice during Thanksgiving weekend, which is virtually unheard of. The rest of the season saw extremely cold portions, which seemed to cause quick migration and overflight in (especially southern) parts of the state.

Weekly waterfowl counts were performed on state properties and national wildlife refuges, 27 August to 28 January. Most waterfowl counts decreased relative to 2007, but

remained above five-year averages (Table 1).

Overall dabbler counts are driven by mallard numbers in the state (Figures 1, 2, 8a). Mallards peaked the last week of December, two weeks later that during 2005-07 (Figure 2). However, we saw many peaks in the South Zone especially in 2008, with large pulses of migration rather than the usual sustained peak then decrease. The peak mallard count was 24,467, down 5.3% from 2007, but still 25% above the 5-year average. Wood ducks peaked the first week of October, four weeks later than in 2007 but in line with other recent years (Figure 3). The peak wood duck count was 3,461, down 36% from 2007 and 22% from the 5-year average. The peak black duck count of 1,197 occurred during the second week of December, a week later than in 2007 (Figure 4). The number of black ducks increased 15% from 2007 and was up 44% from the 5-year average. Green-winged teal peaked at 982, which was 11% lower than 2007 and 3% lower than the 5-year average. Peak numbers of green-winged teal were observed in the third week of October, about the same as in 2007. Blue-winged teal peaked during the first week of September, which was five weeks earlier than 2007. The peak count of blue-winged teal (985) was 12% lower than the 2007 peak count, and 4% lower than the 5-year average. The combined teal migration data are shown in Figure 5. Divers peaked during the third week of November at 3,534 birds, two weeks earlier than in 2007 (Figure 6). This was a 62% increase from 2007, and a 20% increase from the 5-year mean.

Canada goose migration through Indiana peaked at 13,659 observed birds the week of 28 January, similar to 2007 and other recent years (Figure 7). The South Zone peaked the week of 28 January at 12,307 birds, the highest count since 2000-01. This was probably weather-related, as we seem to have had the largest influx of wintering *B. c. interior* geese in recent memory. The statewide peak was 7% higher than 2007, and 24% above the 5-year average.

2009 Spring Canada Goose Survey. A total of 11 high-density plots, 34 medium-density plots, and 58 low-density plots were surveyed during 7, 9, and 15 April and 4 May 2009. In addition, 61 urban road surveys were driven in April. The estimated statewide population of giant Canada geese was 84,215 (95% CI 18,005) compared to 102,700 (95% CI 31,850) in 2008 (Table 2). The estimated number of breeding pairs was 41,104 (CI ± 8,801), compared to 49,131 (CI ± 15,231) in 2008.

2009 Spring Duck Survey. A serious attempt to estimate breeding mallard populations was intended this year. However, due to the reduced flight time described above, the sample size was insufficient to produce mallard estimates. Therefore, breeding duck estimates were not derived again this year.

Discussion and Recommendations

The peak numbers of waterfowl observed on the survey areas had been decreasing since the late 1990s, although peak duck counts have been stable since about 2003, depending on zone (Figures 8a and b). This could be related to birds spending time off of traditionally surveyed areas (that is, spending more time on private land, such as power company cooling ponds, than on public lands containing good habitat). Because harvest

has not decreased over the same period, it seems unlikely that we are actually seeing fewer birds pass through Indiana (Figures 9 and 10).

We continue operating under the assumption that the weekly waterfowl counts are a useful index to waterfowl migration: it seems unlikely that numbers and/or species peak at different times on surveyed properties than they do on other areas. The only time that the survey is problematic is when all surveyed areas are frozen but other areas are not. However, during these times, most waterfowlers are unable to hunt anyway, since open areas are likely on the rivers, which require specialized equipment. An evaluation of available waterfowl winter habitat on state-owned properties needs to occur. The possibility of conducting statewide waterfowl surveys should be considered, though it is likely that comprehensive statewide surveys would be prohibitively expensive.

Despite the best efforts of the waterfowl biologist to schedule flight days early in the survey period, only three good survey days were flown during the 2009 Canada goose breeding survey. This is because the weather was unsuitable early in the month, and the waterfowl flights were regularly bumped by other helicopter users. In addition, the maintenance period for the aircraft fell directly in the middle of the survey period. Since the sale of the second helicopter, it has become essentially impossible to get enough flight time to survey all six days that are necessary. The waterfowl biologist will evaluate other methods of breeding goose surveys to determine if there is an alternative to the helicopter.

In addition to flight scheduling problems, due to state budget issues, the waterfowl biologist intermittent position was not filled until well after the spring survey period. This means that the goose surveys only had one observer on board, rather than the usual two. This may partially account for the lower number of observed geese.

The number of routes in the urban Canada goose survey was greatly increased this year, and transect width was reduced to a more realistic 50m. This increased the estimate of urban geese, and made the current survey results incompatible with past years. However, the new paradigm makes more sense, and should be more accurate for future years. The urban survey process is a learning experience, and the procedures may continue to be altered in future years as new information is gathered.

Literature Cited

USFWS (U.S. Fish and Wildlife Service) and CWS (Canadian Wildlife Service). 1987. Standard operating procedures for aerial waterfowl breeding ground population and habitat surveys in North America.

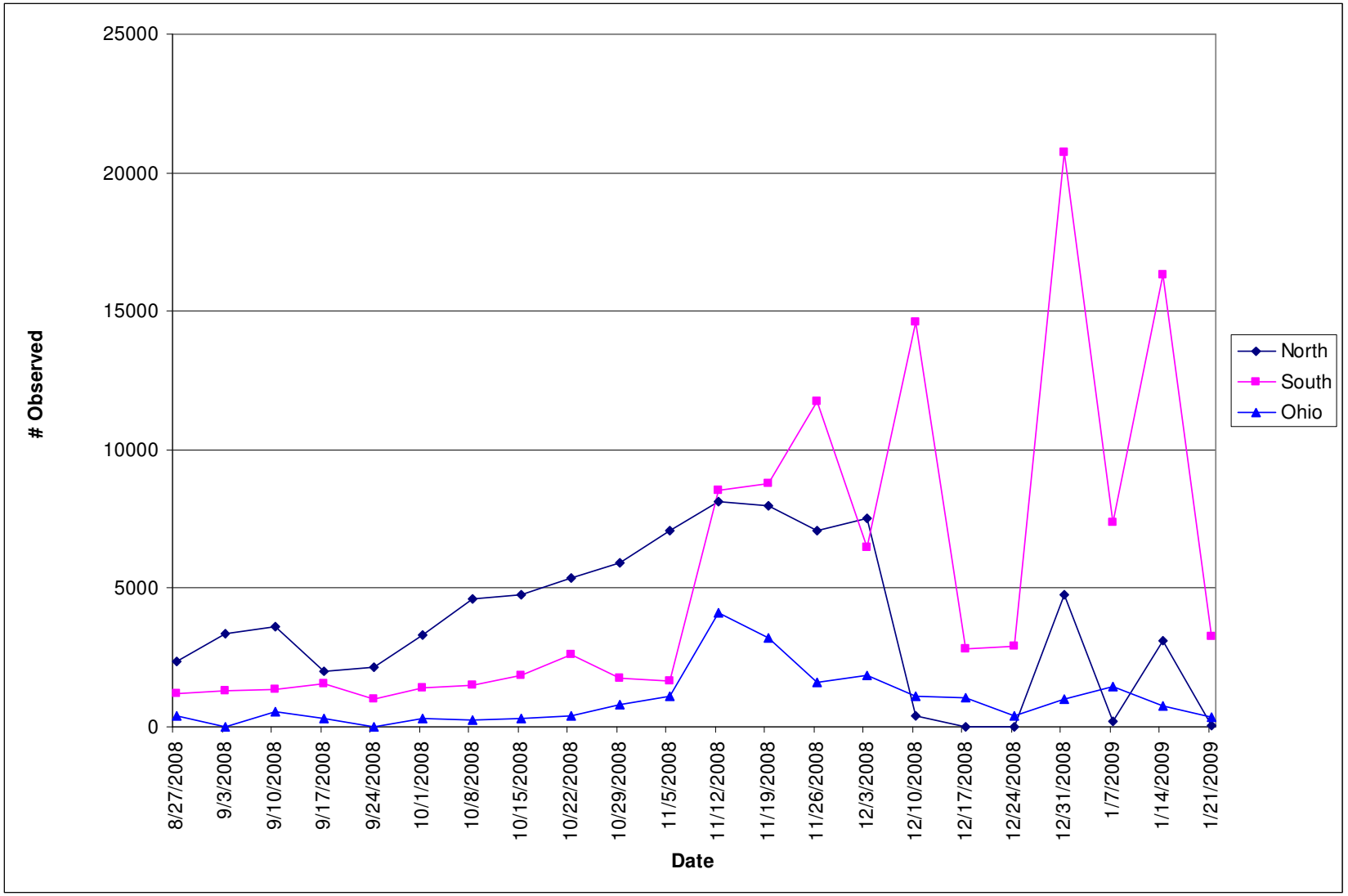

Figure 1. Migration timing of all dabbling ducks in Indiana by zone between 27 August 2008 and 28 January 2009.

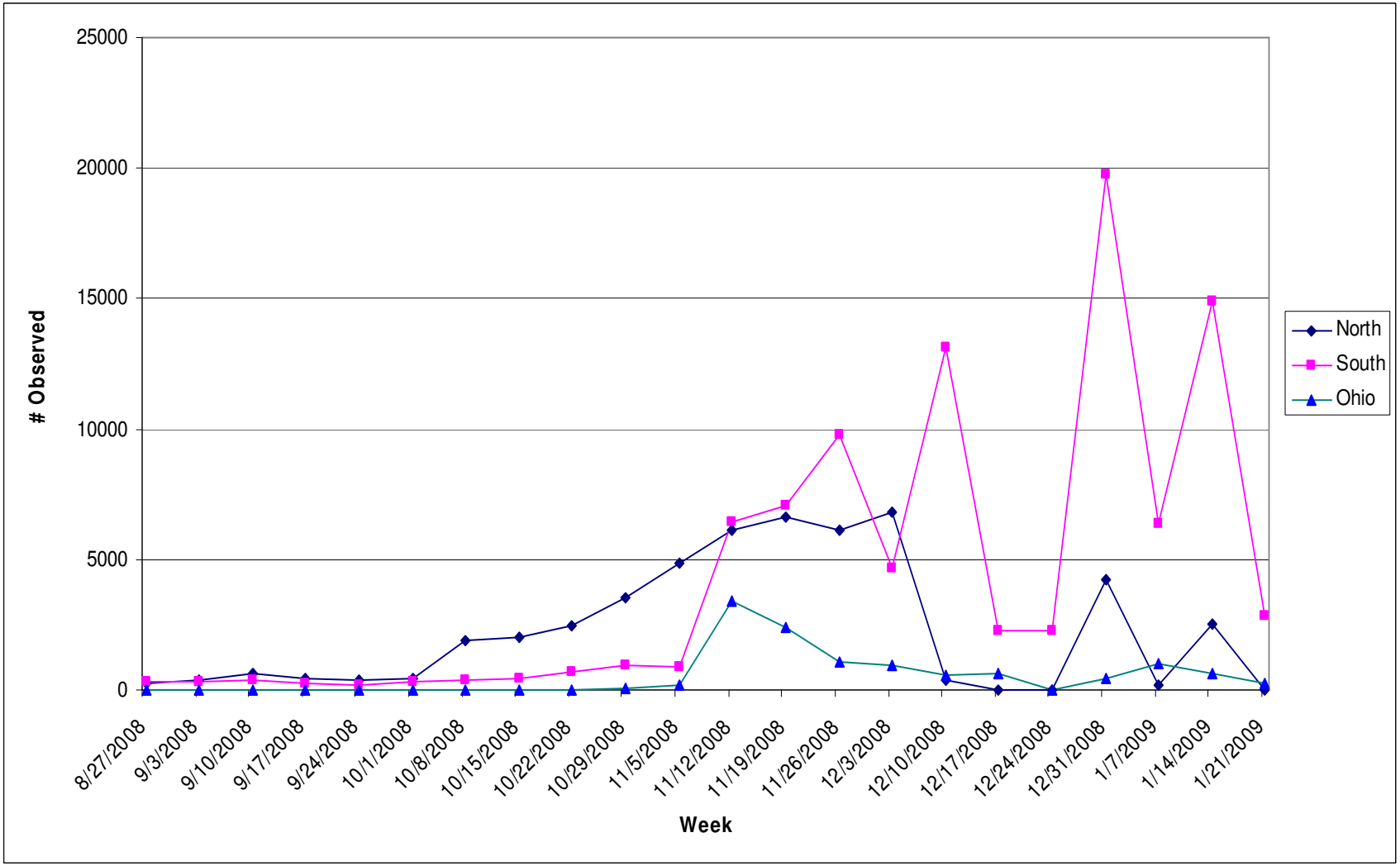

Figure 2. Migration timing of mallards in Indiana by zone between 27 August 2008 and 28 January 2009.

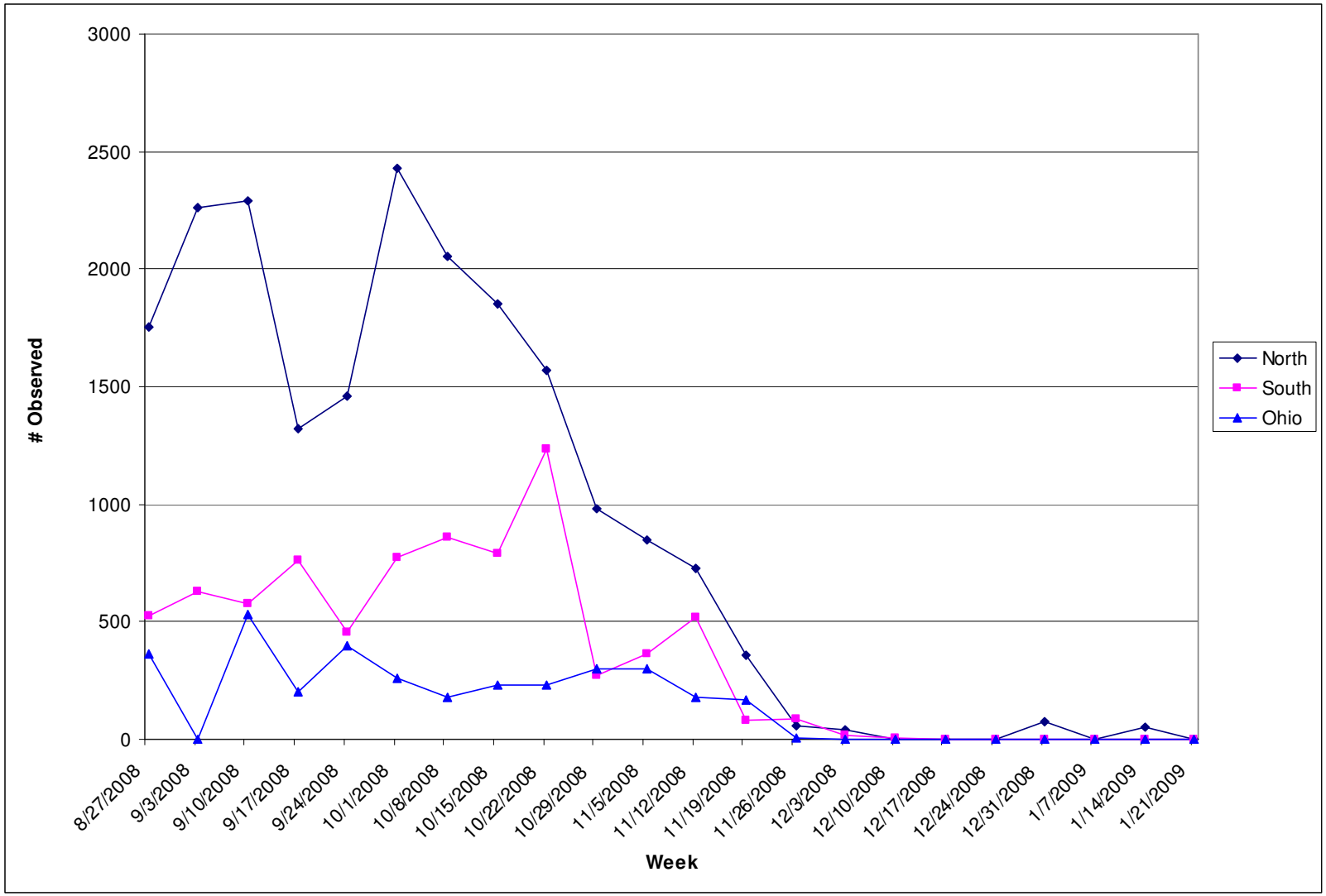

Figure 3. Migration timing of wood ducks in Indiana by zone between 27 August 2008 and 28 January 2009.

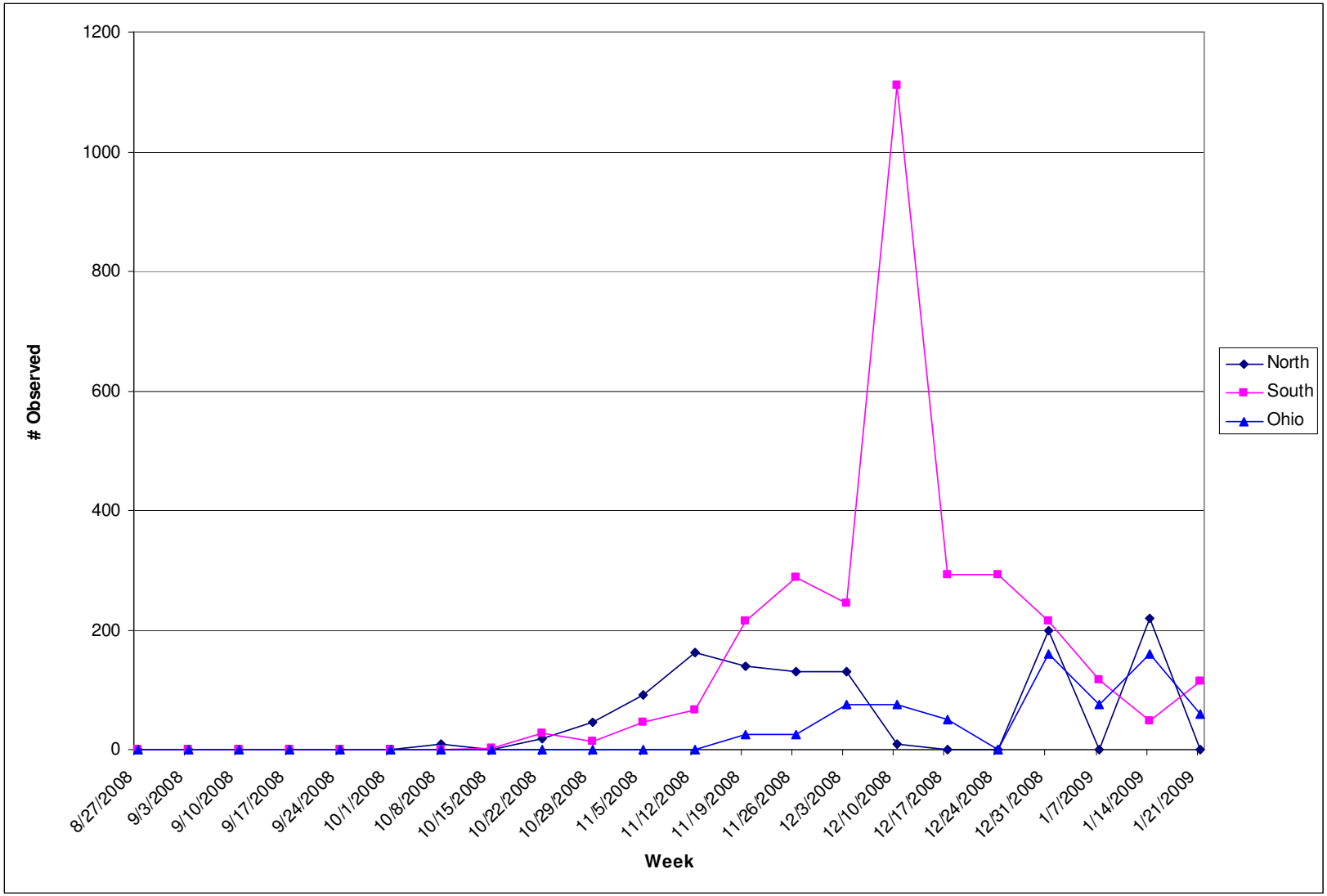

Figure 4. Migration timing of black ducks in Indiana by zone between 27 August 2008 and 28 January 2009.

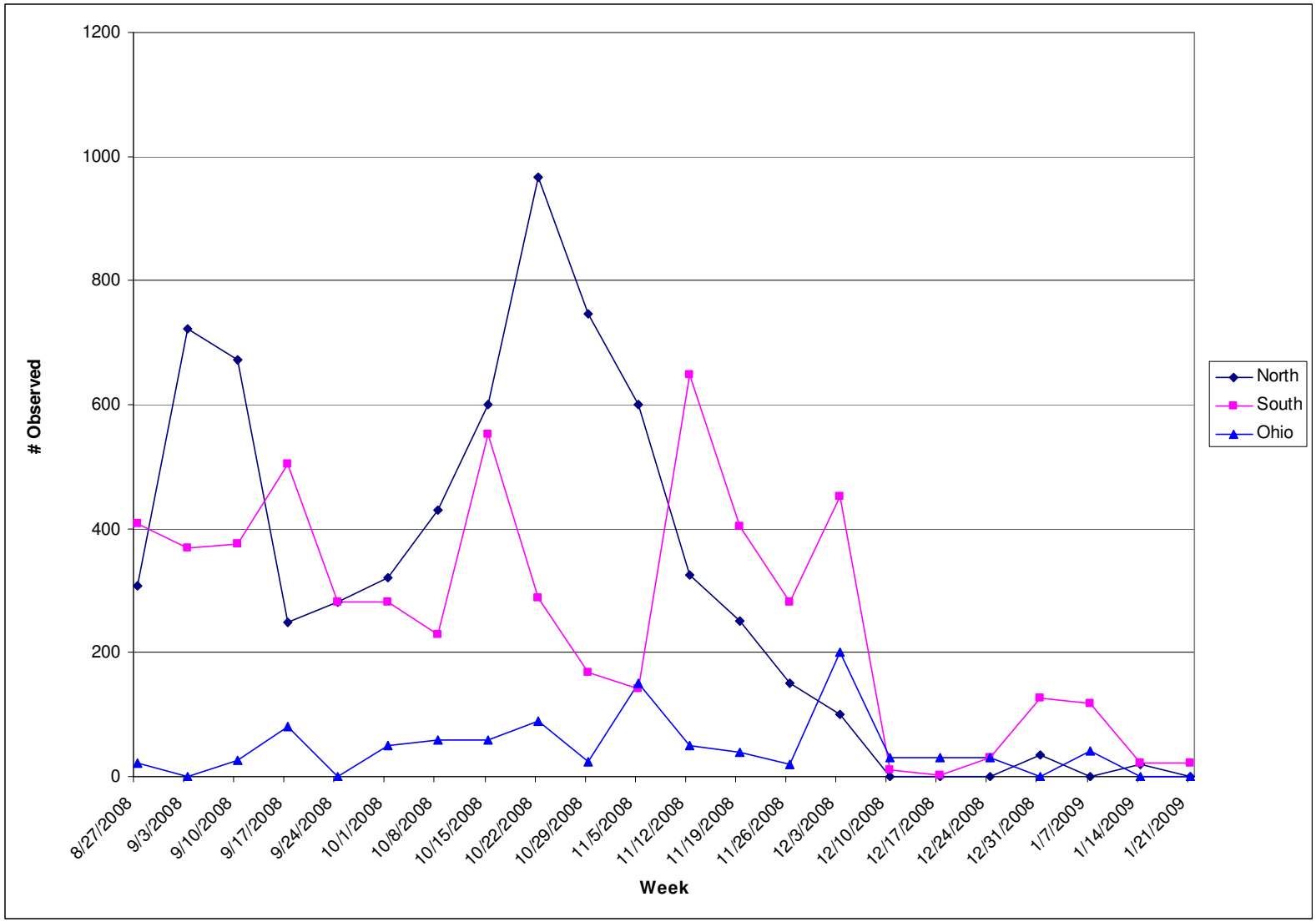

Figure 5. Migration timing of teal (both species) in Indiana between 27 August 2008 and 28 January 2009.

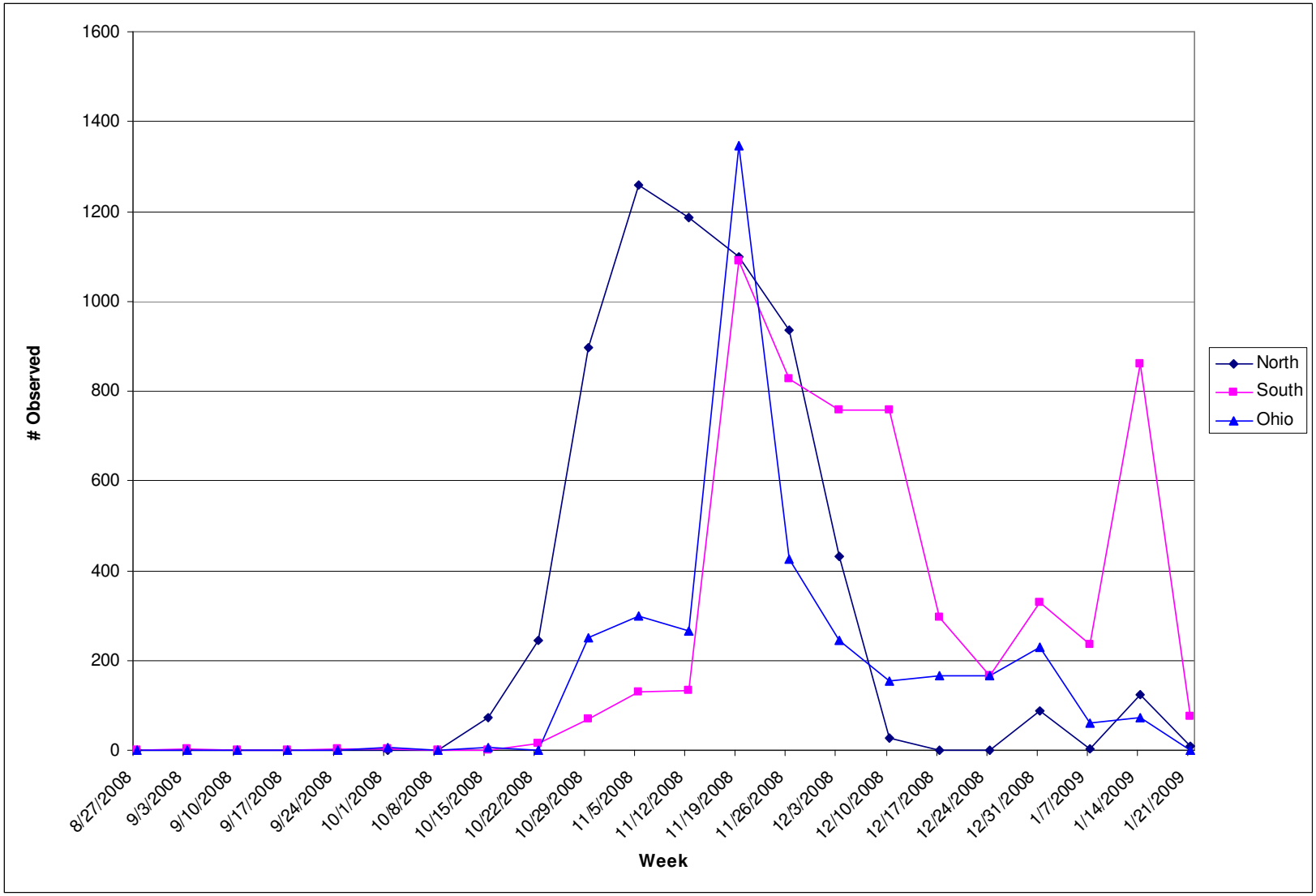

Figure 6. Migration timing of diving ducks in Indiana by zone between 27 August 2008 and 28 January 2009.

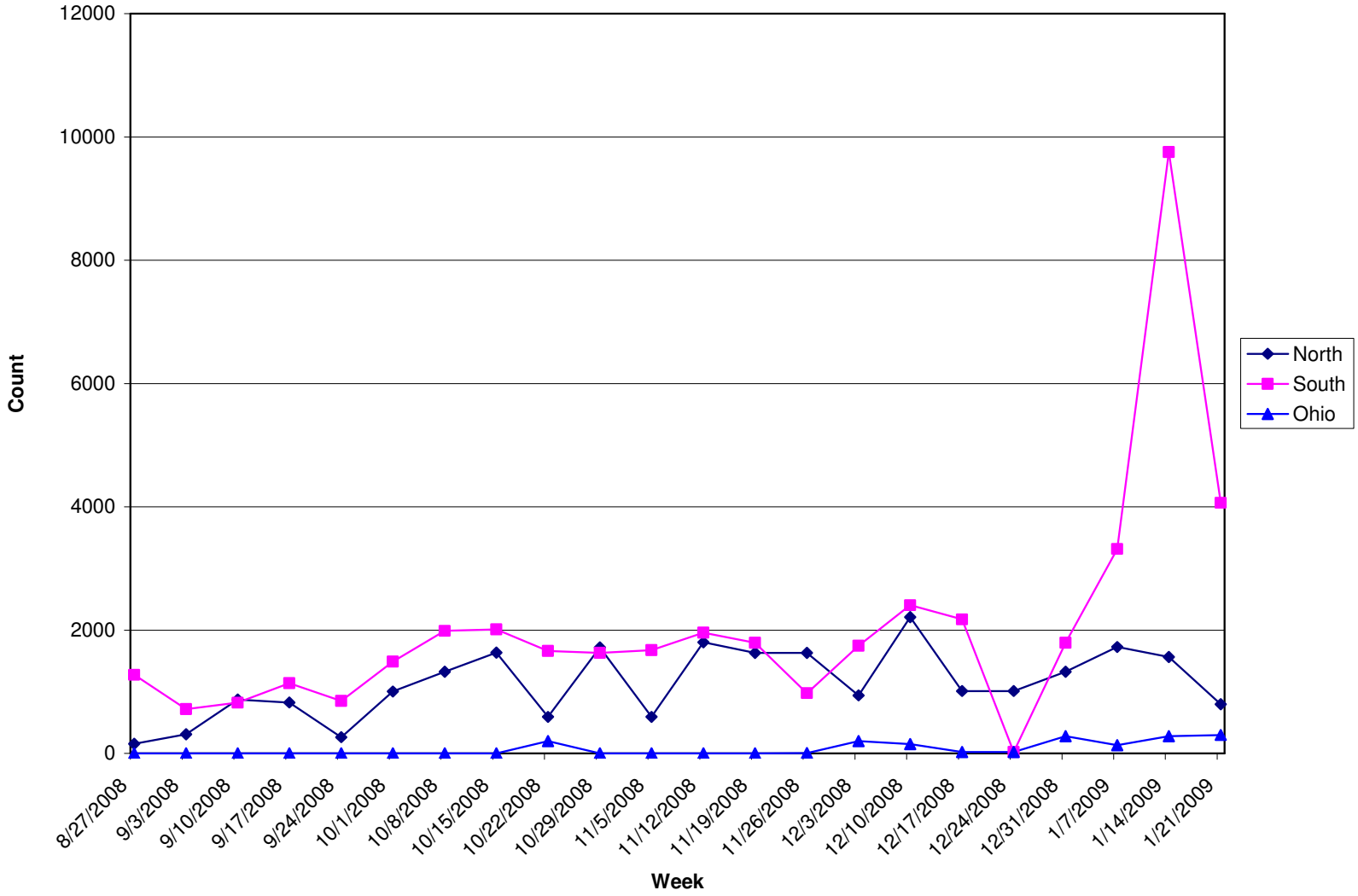

Figure 7. Migration timing of Canada geese in Indiana by zone between 27 August 2008 and 28 January 2009.

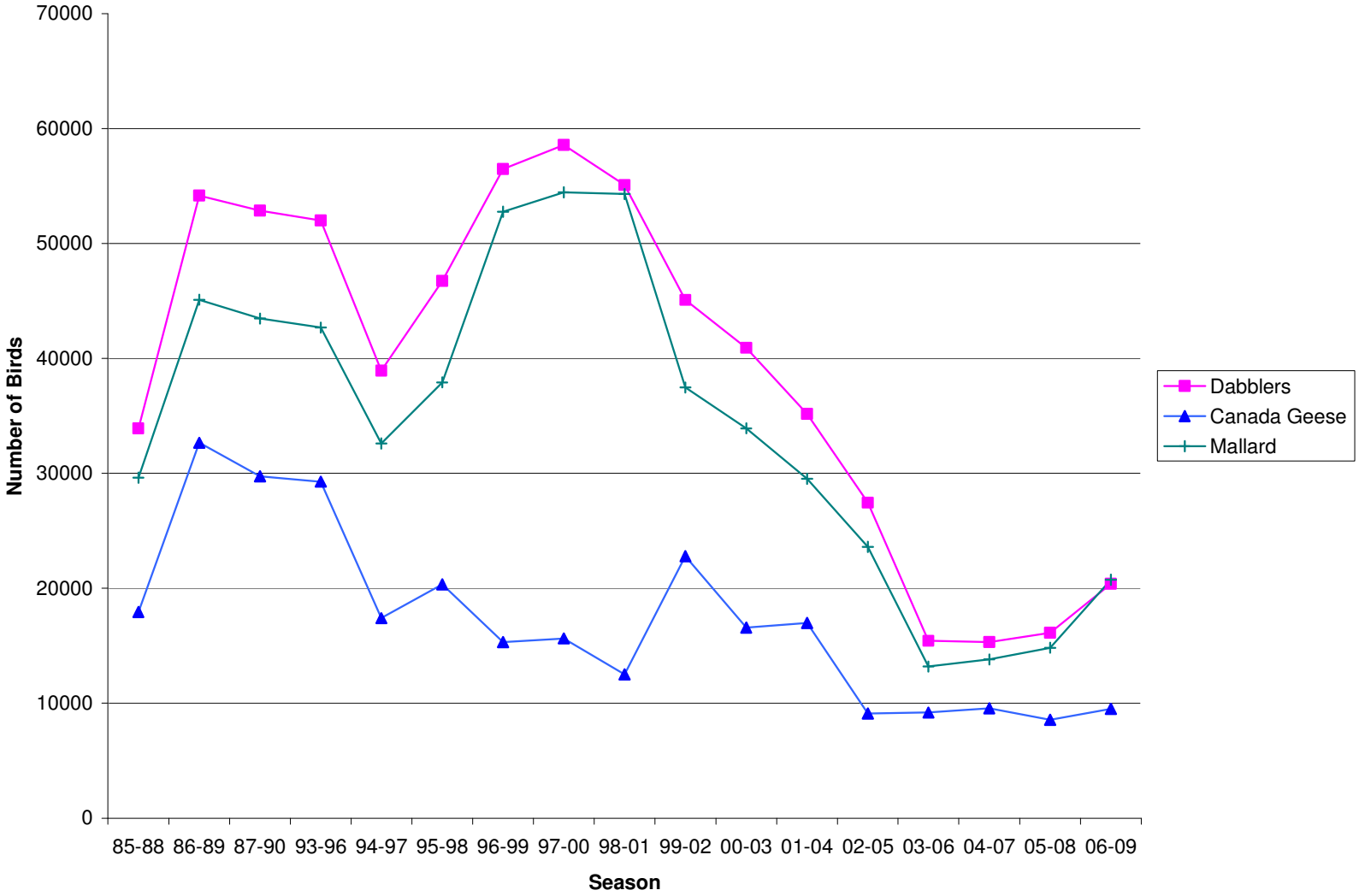

Figure 8a. Three year average peak waterfowl counts in Indiana 1985-88 – 2006-09.

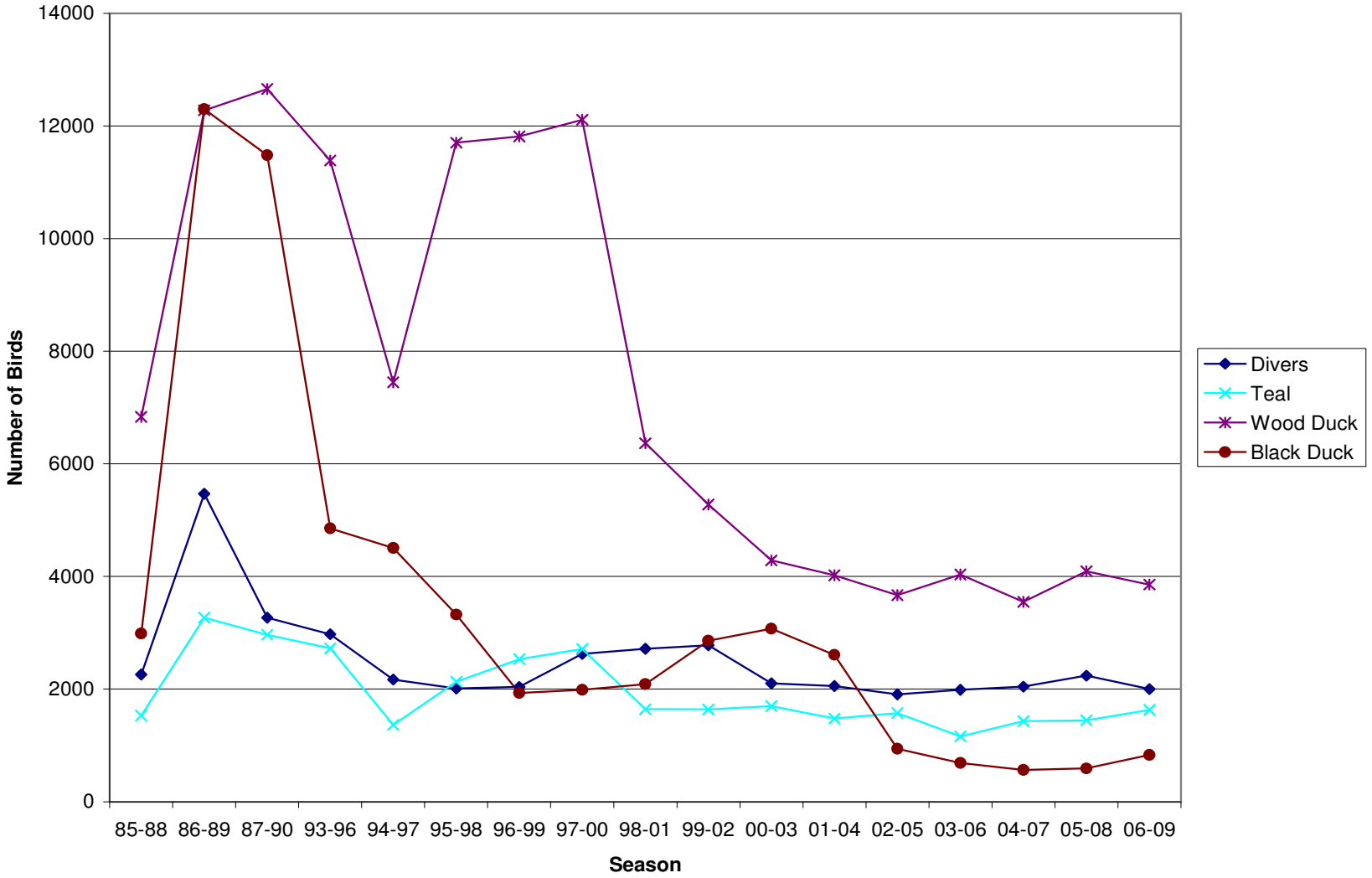

Figure 8b. Three year average peak waterfowl counts in Indiana 1985-88 – 2006-09.

Figure 9. Canada goose harvest and peak survey count (statewide). Harvest is estimated from HIP. Notice that harvest continues to increase despite a stable total peak count during the survey. This likely indicates that many birds are not being counted.

Figure 10. Total duck harvest and peak survey count (statewide). Harvest is estimated from HIP. Notice that harvest continues to increase despite a decrease in total peak count during the survey. This likely indicates that many birds are not being counted.

Table 1. Peak waterfowl migration counts on survey areas in Indiana from September through January, 2004-2008.

GROUP/SUBGROUP/SPECIES	2004-05	2005-06	2006-07	2007-08	2008-09	5 Year Avg	Dif 2007/2008	% Change	Dif from 5yr	% Change
ALL DABBLERS	11,140	22,443	20,718	31,486	26,472	22,452	-5,014	-15.9	+4,020	+17.9
MALLARDS	8,684	20,064	18,865	25,832	24,467	19,582	-1,365	-5.3	+4,885	+24.9
WOOD DUCK	4,997	3,489	4,810	5,406	3,461	4,433	-1,945	-36.0	-972	-21.9
BLACK DUCK	412	877	625	1,041	1,197	830	+156	+15.0	+367	+44.1
GREEN-WINGED TEAL	411	1,324	1,265	1,102	982	1,017	-120	-10.9	-35	-3.4
BLUE-WINGED TEAL	994	1,010	1,005	1,117	985	1,022	-132	-11.8	-37	-3.6
DIVERS AND MERGANSERS	4,079	2,349	2,568	2,180	3,534	2,942	+1,354	+62.1	+592	+20.1
CANADA GOOSE	9,914	10,039	8,664	12,789	13,659	11,013	+870	+6.8	+2,646	+24.0

Table 2. Estimates of total and breeding pairs of Canada geese in Indiana.

Year	Estimated Statewide Population	95% C.I.	Breeding Pairs	95% C.I.
2009 [1]	84,215	66,209 – 102,220	41,104	32,303 – 49,905
2008	102,700	70,850 – 135,500	49,131	33,900 – 64,360
2007	125,300	87,739 – 162,861	56,375	39,125 – 73,625
2006 [2]	175,900	87,277 – 264,163	49,907	10,928 – 88,886
2005	94,979	66,982 – 122,976	33,378	23,960 – 42,796
2004	80,200	50,777 – 109,623	30,839	Not available
2003	95,640	63,808 – 127,472	50,638	30,969 – 70,307
2002	----- NO SURVEY -----			
2001	121,052	72,212 – 169,892	53,391	35,102 – 71,680
2000	121,340	75,219 – 167,461	47,872	33,662 – 62,082
1999	88,966	54,824 – 123,108	37,807	24,490 – 51,124
1998	78,857	56,918 – 100,796	34,655	25,777 – 43,533
1997	87,633	75,555 – 99,711	37,591	32,013 – 43,169
1996	----- NO SURVEY -----			
1995	63,033	39,793 – 86,273	24,005	16,107 – 31,903
1994	69,650	46,350 – 92,950	11,900	6,550 – 17,250
1993	67,491	Not calculated	---	---

[1] The 2009 survey may reflect an underestimate. Few flight days resulted in a poor sample size, with most survey plots concentrated in low density areas.
[2] The 2006 survey likely overestimates statewide population, due to poor sample size.